

Analysis of Year 2002 Seasonal Forest Dynamics Using Time Series *in situ* LAI Measurements and MODIS LAI Satellite Products

Andrew N. Pilant¹, Jayantha Ediriwickrema², Timothy E. Lewis³, John S. Iames¹, and Ross S. Lunetta¹

¹U.S. Environmental Protection Agency, National Exposure Research Laboratory, Research Triangle Park, NC 27711

²IBM, Research Triangle Park, NC 27711

³U.S. Environmental Protection Agency, National Center for Environmental Assessment, Research Triangle Park, NC 27711

ABSTRACT

Multitemporal satellite images are the standard basis for regional-scale land-cover (LC) change detection. However, embedded in the data are the confounding effects of vegetation dynamics (phenology). As photosynthetic vegetation progresses through its annual cycle, the spectral signals of the landscape change. This research seeks to incorporate vegetation phenology as a tool for improving LC change detection. The Moderate-Resolution Imaging Spectroradiometer (MODIS) instrument aboard NASA's Terra spacecraft provides two geophysical products used in this analysis: Normalized Difference Vegetation Index (NDVI: MOD13Q1) and Leaf Area Index (LAI: MOD15A2). NDVI is related to ecosystem state, and LAI is an important input to ecosystem and landscape process models. LAI is of interest as an input to landscape process and biogenic volatile organic compounds emissions models. The U.S. Environmental Protection Agency (EPA) has established a number of long-term forest research sites in the Piedmont and Coastal Plain of the Albemarle-Pamlico Basin of North Carolina and Virginia (USA) to establish *in situ* reference data for validation of satellite geophysical products (e.g., NDVI and LAI). At each site, we conduct biophysical surveys of vegetation species composition and landscape characteristics, as well as time series optical surveys of LAI at various phenological stages. LAI is estimated indirectly using combined hemispherical photography and TRAC (Tracing Architecture and Radiation of Canopies) instrument optical surveys arranged in permanent grids and transects. This report focuses on the architectural rather than spectral aspects of remote sensing of forest canopy. We present results of an analysis of *in situ* and MODIS LAI time series data for 2002.

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